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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,307	09/27/2006	Hiroynki Yamazaki	NE353-PCT(US)	3548

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VIENNA, VA 22182-3817

EXAMINER

ZHANG, YUANDA

ART UNIT	PAPER NUMBER
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2828

MAIL DATE	DELIVERY MODE
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08/27/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/594,307

Applicant(s)

YAMAZAKI, HIROYUKI

Examiner

YUANDA ZHANG

Art Unit

2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 July 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-26 is/are rejected.
- 7) ☒ Claim(s) 6 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 07/13/09 has been entered.

Response to Amendment

2. Amendment to claims 1, 19, 21 and 25 are acknowledged. The Examiner notes that the objection of claim 25 has been withdrawn as a result of the amendment. In addition, the Applicant has argued that Jones teaches away from the limitations of "a reflection film provided to a second end of the reflection-side waveguide, wherein said reflection film comprises a high-reflection film capable of reflecting laser light without regard to a wavelength of a transmission peak of said laser light" now recited in amended claim 1 because Jones explicitly discloses that Bragg grating 42 only reflects light having a wavelength corresponding to one of the transmission peaks received from the ring resonator 42 as shown in figure 7. The Examiner has found the argument persuasive and the previous Office action has been withdrawn.

Response to Arguments

3. Applicant's arguments with respect to claims 1-5 and 7-26 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1-5, 7-9, 12-21 and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ma (US Patent 6,891,865 B1) in view of Chin et al (US Patent 6,643,421 B1) and Po (US Patent 4,852,117).

7. In re claim 1, with reference to figure 12B, Ma discloses a tunable laser (101b), comprising: a multiple ring resonator in which a plurality of ring resonators (multiple resonator 122i – 122iii, col. 14 lines 47-50); an LD-side waveguide (waveguide 124, col. 11 lines 66-67) having a first end connected to one of the plurality of ring resonators through evanescent coupling (col. 11 lines 18-26); a reflection-side waveguide (126, col. 11 lines 66-67) having a first end connected to other one of the plurality of ring resonators through evanescent coupling (col. 11 lines 18-26); a single board (121, col. 3 lines 38-41 & also see figure 20A) on which the ring resonator, the LD-side waveguide

(124) and the reflection-side waveguide (126) are formed; a reflection film (high reflection coating 154, col. 13 lines 6-10) provided to a second end of the reflection-side waveguide, wherein said reflection film comprises a high-reflection film capable of reflecting laser light without regard to a wavelength of a transmission peak of said laser light; a laser diode chip (110, col. 11 lines 49-54) having a low reflection film (AR coating 119, col. 11 lines 57-59) formed on one of two opposing emission end faces, which is optically coupled to the LD-side waveguide through the low reflection film (col. 12 lines 7-12); a tuning device (electrodes 128i-128iii, col. 14 lines 55-57) for changing a resonance wavelength of only the multiple ring resonator (col. 3 lines 16-19).

8. Ma does not disclose the plurality of ring-type waveguides having optical path lengths different from each other. However, with reference to figure 2, Chin et al disclose a plurality of ring type waveguides (14A-14D) having optical path lengths different from each other (col. 2 lines 25-30). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the plurality of ring-type waveguides of Ma with the plurality of ring-type waveguides having different optical path lengths as taught by Chin et al in order to obtain a wider range of tunable wavelengths.

9. Ma does not disclose the plurality of ring-type waveguides are coupled through an optical coupling device. With reference to figure 10, Po discloses a multiple ring resonator in which a plurality of ring resonators (pump loop 18" and additional loop 136), which are constituted with ring-type waveguides having optical path lengths different from each other ("the additional cavity is of slightly different length"), are

coupled through an optical-coupling device (lateral coupling 141 & 142) (col. 13 lines 50-64). It would have been obvious to one having ordinary skill in the art at the time the invention was made to couple the plurality of ring-type waveguides with an optical coupling device since it was known in the art that an optical coupler as taught by Po is commonly use to couple between two micro-ring resonators.

10. In re claim 2, Ma discloses wherein the multiple ring resonator contains at least two or more of the ring resonators (col. 14 lines 47-50).

11. In re claim 3, Ma discloses wherein the low reflection film (AR coating 119) of the laser diode chip is abutted against the LD-waveguide to be optically coupled (col. 11 lines 57-59).

12. In re claims 4 & 5, Ma discloses wherein the low reflection film of the laser diode is optically coupled to the LD-side waveguide through an optical device (coupling lens 111, col. 12 lines 7-12).

13. In re claim 7, Po discloses wherein the optical-coupling devices comprise directional couplers (lateral couplers 141 & 142) (col. 13 lines 50-64).

14. In re claims 8, 9, 20, 21 & 26, Ma discloses wherein the tuning device changes refractive indexes of the ring-type waveguides of the ring resonators for changing the resonance wavelength (col. 3 lines 16-19).

15. In re claims 13 & 15, Ma discloses wherein a stray light suppressing part (interpreted to be the reflection film 154 or a light receiving element) for suppressing influence of a stray light that is emitted from an end face extended from one end of the reflection-side waveguide is provided (col. 13 lines 6-10).

16. In re claim 14, Po discloses wherein a filter (lateral coupler 141 & 142) for letting through light of only a specific range of wavelengths is inserted between the ring resonators (inherent property of the lateral coupler) (col. 13 lines 50-64).

17. In re claims 16 & 17, Ma / Chin et al / Po have disclosed the claimed invention except the laser diode chip is mounted on the board (the limitation of "by a passive alignment technique" is not considered because it's a product-by-process limitation) which thereby renders alignment of the optical axis unnecessary. It would have been obvious to one having ordinary skill in the art at the time the invention was made to mount the laser diode on the same board since it was known in the art that mounting the laser diode on the same board with the waveguide makes the device more compact by reducing excessive space for extra board and avoid alignment issue.

18. In re claim 18, Ma / Chin et al / Po have disclosed the claimed invention above except wherein the reflection film comprises one of a dielectric multilayer film and a metal film. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a dielectric multilayer film and a metal film to be the reflection film in order to maximize reflection, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

19. In re claim 19, Ma discloses wherein the reflection film reflects laser light without tuning regardless of said changed resonance wavelength of said multiple ring resonator (no tuning needed for the reflection film 154) (col. 13 lines 6-10).

20. In re claims 23 & 24, Ma discloses wherein film-like heaters (electrodes 128i – 128iii) are provided as the tuning device (col. 14 lines 55-57).

21. In re claim 25, Ma / Chin et al / Po have disclosed the claimed invention above except wherein a wavelength of said reflection peak can be shifted over entire regions of C-band and L-band (1.53 micron - 1.625 micron). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the wavelength of the reflection peak of Ma / Chin et al / Po with shifting in a range of 1.53 – 1.625 micron, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233 MPEP 2144.05 (II-A)

22. Claims 10-12 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ma (US Patent 6,891,865 B1), Chin et al (US Patent 6,643,421 B1) and Po (US Patent 4,852,117) as applied to claim 1 above, and further in view of Margalit et al (US Patent 6,668,006 B1).

23. In re claims 10-11, Ma / Chin et al / Po have disclosed the claimed invention except a wavelength detecting device for detecting a resonance wavelength of the multiple ring resonator. However, with reference to figure 10, Margalit et al disclose a wavelength detecting device (PD1 and PD2) for detecting resonance wavelength of the multiple ring resonator (col. 8 lines 23-26). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a photo-detector

for detecting the resonance wavelengths since it was known in the art that photo-detector is commonly used for detecting optical input.

24. In re claims 12 and 22, Ma / Chin et al / Po have disclosed the claimed invention except a control device for feedback-controlling resonance of the multiple ring resonator based on resonance wavelength information detected by the wavelength detecting device. However, with reference to figure 10, Margalit et al disclose a control device (Monitor) for feedback-controlling resonance of the multiple ring resonator based on resonance wavelength information detected by the wavelength detecting device (PD1 & PD2). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the tunable laser of Ma / Chin et al / Po with a control unit as taught by Margalit et al in order to obtain a desired wavelength (or constant wavelength) by monitoring the optical power of the laser device.

Allowable Subject Matter

25. Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

26. The following is an examiner's statement of reasons for allowance: Chin et al disclose a plurality of ring-type waveguide resonators having different optical path lengths or radius (see rejection of claim 1 above). However, Chin et al fail to disclose any relationship between the optical path lengths and the intervals of reflection peaks in which the diameters of the ring resonators are set so that the intervals of reflection peaks appearing periodically become different and generate a resonance at a meeting

point of the reflection peaks. Therefore, claim 6 is believed to be allowable over the cited prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YUANDA ZHANG whose telephone number is (571)270-1439. The examiner can normally be reached on Monday-Friday, 9:00am-5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Yuanda Zhang/
Examiner, Art Unit 2828
08/20/09

/Minsun Harvey/
Supervisory Patent Examiner, Art Unit 2828